REMARKS

Claims 1-14 (erroneously numbered 1-15 without No. 12) were submitted for examination. In this Office Action, Claims 1, 6 and 9 are rejected under 35 USC 102(b) as being anticipated by Lee, GB Publication 2240429 (hereinafter "Lee"), and Claims 2-5, 7, 10-11, 13-14 are rejected under 35 USC 103(a) as being unpatentable over Lee and in view of Applicant's admitted prior art.

The Examiner is appreciated for the thoughtful examination and comments in the Office Action. Instead of amending the claims enormously, the Applicant chose to cancel Claims 1-14 and add new claims 16 - 35 in the foregoing amendments to clearly distinguish from the cited references. No new matters are introduced. Consideration of Claims 16 - 35 is respectfully requested in view of these amendments and the following remarks.

Claim 16 now recites:

> forming a substrate with a first conductive type of a semiconductor material; and
> forming a layer on top of the substrate, the layer being a second conductive type so as to form a junction that prevents substrate noise diffused into photo elements formed above the layer when a first power potential is applied to the substrate and a second power potential is applied to the layer, wherein the junction is reversely biased, and
> wherein the CMOS image sensor is integrated with accessory CMOS circuits to facilitate the CMOS image sensor to operate as desired.

(*Emphasis added*)

To facilitate the understanding of the distinctive features recited in Claim 16, the Applicant wishes to brief the key differences between CCD (charge coupled device) and CMOS (complementary metal oxide semiconductor) image sensors. CCD and CMOS are two different technologies for capturing images although both types of imagers convert light into electric charge and process it into electronic signals. In a CCD sensor, every pixel's charge is transferred through a very limited number (often one) of output nodes to be converted to voltage, buffered, and sent off-chip as an analog signal. In a CMOS sensor, each pixel has its own charge-to-voltage conversion, and the sensor often also includes other circuitry (e.g., digitization circuits) so that the chip may output a

digital signal. However, it is well known in the art that images from a CMOS sensor are noisy than that from a CCD sensor because of the inherent process in the CMOS sensor. FIG. 1 of the present invention shows a conventional CMOS design and also illustrates the mechanism why substrate noise can be diffused into photo elements.

One of the objectives in the present invention is to overcome the noise issue by building inherently a substrate noise barrier. According to Claim 16, such substrate noise barrier is achieved by "*forming a reversely biased junction that prevents substrate noise diffused into photo elements formed above the layer when a first power potential is applied to the substrate and a second power potential is applied to the layer*", as recited in Claim 16. Further, the CMOS image sensor is integrated with accessory CMOS circuits to facilitate the CMOS image sensor to operate as desired.

In contrast, Lee discloses a technique for manufacturing a photo diode for a CCD image sensor. Although, Lee shows that a P layer is implemented on top of an N substrate, Lee is silent on a junction being formed by the layer and the substrate to prevent substrate noise diffused into photo elements formed above the layer. The reason is that Lee would not experience in CCD sensor the substrate noise issue commonly seen in CMOS sensor as the two processes are fundamentally different. The Applicant submits it is non-trivial to form a reversely biased PN junction in CMOS to prevent substrate noise diffused into other photo elements in the CMOS sensor.

Further, Claim 16 recites "... the CMOS image sensor is integrated with accessory CMOS circuits to facilitate the CMOS image sensor to operate as desired", which is neither taught nor suggested in Lee. In fact, it is well known, also shown from the above described differences between CCD and CMOS, that a CCD sensor *can not be* integrated with accessory CMOS circuits. The integration of accessory circuits with a CMOS sensor is one of the key features of a CMOS sensor over a CCD sensor. Accordingly, the Applicant submits that the combined features recited in Claim 16 are neither taught nor suggested by Lee, and the claim 16 shall be allowable over the cited references. Consideration of claims 16-27 is respectfully requested.

Claim 28 is an apparatus claim incorporating substantially similar features recited in Claim 16. The Applicant wishes to apply the above reasons to support Claim 28. Accordingly, the Applicant submits that the combined features recited in Claim 28 are neither taught nor suggested by Lee, and the claim 28 shall be allowable over the cited references. Consideration of claims 28-35 is respectfully requested.

In view of the above amendments and remarks, the Applicant believes that Claims 16-35 shall be in condition for allowance over the cited references. Early and favorable action is being respectfully solicited.

If there are any issues remaining which the Examiner believes could be resolved through either a Supplementary Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at (408)777-8873.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to "Commissioner of Patents and Trademarks, Washington, DC 20231", on July 31, 2004.

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Respectfully submitted;

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